REMARKS

Reconsideration and allowance of this application are respectfully requested. Claims 1-12 are pending in the application. The rejections are respectfully submitted to be obviated in view of the remarks presented herein.

Applicant notes that the Examiner again did not acknowledge receipt of the certified copy of the priority document filed April 3, 2001. Applicant respectfully requests acknowledgment by the Examiner of the certified copy of the priority document in the next office communication. Specifically, Applicant respectfully requests Examiner to check the appropriate box (1.) under section 12)a) on the PTOL-326 Office Action Summary form.

Rejection Under 35 U.S.C. § 103(a) of Claims 1, 5 and 7

Claims 1, 5 and 7 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the Applicant Admitted Prior Art in view of Teng et al. (U.S. Patent Number 5,285,280; hereinafter "Teng") in further view of Dieterich et al. (U.S. Patent Number 5,065,242; "Dieterich"). The rejection is respectfully traversed.

Regarding independent claim 1, the claimed invention relates to an apparatus for adjusting filter tap length of an adaptive equalizer. The apparatus includes a multipath detector and a tap length adjusting unit. The multipath detector detects multipath information from a difference between the correlation values of input data applied to the adaptive equalizer and a training sequence, and from an auto correlation value of a training sequence when the training sequence is valid. The tap length adjusting unit generates a tap length control signal based on

positions of the farthest pre-/post-ghosts by using the detected multipath information and a field sync signal.

Turning to the cited art, the Description of the Related Art section of the present application describes a data frame of a vestigial side band transmission system as shown in Figure 1a. Additionally, a data field sync segment is described as shown in Figure 1b. In an adaptive equalizer, the number of taps "is generally determined by the maximum range of ghosts to be canceled" (page 2, lines 16-18). Conventionally, 63 symbol sequences in which symbols of training sequences are alternately reversed have been used to detect and cancel ghosts (page 2, lines 18-20). This conventional detection and cancellation method suffers from a very limited range and a delayed ghost detection time due to the properties of the sequences (page 3, lines 3-15).

Examiner maintains that the combination of Applicant Admitted Prior Art, Teng and Dieterich teaches each feature of the claimed invention. However, Prior Art Figures 1a and 1b solely teach a structure of a data frame. Furthermore, the Description of the Related Art section only generally mentions that the number of taps of the adaptive equalizer is generally determined by the maximum range of ghosts to be canceled. There is no disclosure in the Description of the Related Art section of an apparatus for adjusting a filter tap length for an adaptive equalizer **based on positions of the farthest pre-/post-ghosts by using detected multipath information** (wherein the multipath information is detected from a difference between the correlation values of input data applied to the adaptive equalizer and a training sequence, and from an auto

correlation value of a training sequence when the training sequence is valid) and a field sync signal, as recited in the claim 1.

The claimed apparatus comprises "a multipath detector for detecting multipath information from a difference between the correlation values of input data applied to the adaptive equalizer and a training sequence, and from an auto correlation value of a training sequence when the training sequence is valid; and a tap length adjusting unit for generating a tap length control signal based on positions of the farthest pre-/post-ghosts by using the detected multipath information and a field sync signal. There is no mention in the Description of the Related Art section of any of these elements, as claimed. The Examiner also readily admits in paragraph 3 of the Office Action that the Description of the Related Art section does not disclose implementing the correlation values so as to adaptively adjust the equalizer tap length.

Neither Teng nor Dieterich remedies the deficiencies of the Description of the Related Art section. Teng teaches the cancellation of ghosts in a received video signal by using a tap coefficient signal computed by dividing an auto-correlation of an ideal ghost cancellation reference (GCR) signal by the cross-correlation of the ideal and received GCR signals (column 4, lines 29-40). The tap coefficients are transferred to a FIR filter which filters the received video signal with these coefficients to cancel nearby ghosts (column 6, lines 49-52). Additionally, a prior art ghost canceling channel equalizer as shown in Figures 2(b) and 2(c) is also described. A received GCR signal is extracted from a received video signal and compared to an ideal GCR signal. Based on a discrepancy between the received and ideal GCR signals, tap

coefficients are generated and used in a transversal filter for canceling ghosts (column 2, lines 12-32).

However, there is also no teaching in Teng of detecting multipath information from a difference between the correlation values of input data and a training sequence, and from an auto correlation value of a training sequence when the sequence is valid, as claimed. Teng also fails to disclose generation of a tap length control signal based on positions of the farthest pre-/post-ghosts by using the detected multipath information and a field sync signal. Teng calculates tap coefficients by dividing the auto-correlation of an ideal GCR by the cross-correlation of the ideal and received GCR signals. Alternatively, as described by figures 2(b) and 2(c), Teng calculates tap coefficients based on a discrepancy between received and ideal GCR signals, however, this difference is not found from between the specific correlation values as recited in the claims. Teng merely accepts as inputs to a digital signal process, an extracted received GCR signal and an ideal GCR signal, and computes a ghost tap coefficient signal by dividing auto-correlation of the ideal GCR signal by a cross-correlation of the ideal and received GCR signals in the digital signal processor. Thus, the coefficients are obtained solely from a division result of correlation values in Teng.

Dieterich teaches a deghosting system as shown in Figure 1, in which a logarithmic form of an uncorrupted training signal $X(\omega)$ is subtracted from a logarithmic form of a received signal $Y(\omega)$. The subtraction result is then inverse Fourier transformed to produce delay coefficients for use in delay circuitry to cancel multipath components in a received television circuit. However, Dieterich only discloses a subtraction of a training signal by a subtracter circuit (36)

from a received signal, both signals being in logarithmic form (Figure 1 and column 5, lines 36-52). Additionally, element 112 in Figure 4 compares sample differences provided by a subtracter 50 (Figure 2) and an uncorrupted training signal stored in ROM 94 (column 9, lines 55-63), wherein the sample differences are obtained from a subtraction of multipath signal components (delayed signal paths) from an input signal (column 6, lines 13-31). There is also no mention in Dieterich that multipath information is detected from a difference between the correlation values of input data and a training sequence, and from an auto correlation value of a training sequence when the sequence is valid. Neither correlation values between input data and a training sequence, nor an auto correlation value of a training sequence, are ever generated in Dieterich. Thus, such a difference between correlation values having the relationship as recited in the claims **is not taught or suggested by Dieterich**.

The combination of the Description of the Related Art section with Teng and Dieterich does not create a detection of multipath information as claimed, in which multipath information is detected "from a difference between the correlation values of input data applied to the adaptive equalizer and a training sequence, and from an auto correlation value of a training sequence when the training sequence is valid." Teng calculates tap coefficients based only on a division of an autocorrelation of an ideal GCR signal by a cross correlation of both the ideal GCR signal and a received GCR signal, while Dieterich produces delay coefficients by performing an inverse Fourier transform on a subtraction result of a logarithmic form of an uncorrupted training signal $X(\omega)$ subtracted from a logarithmic form of a received signal $Y(\omega)$. The combination of Teng and Dieterich would not have rendered the claimed invention obvious. The coefficient

calculations of Teng and Dieterich would not have been able to function together because both Teng and Dieterich calculate coefficients to cancel ghosts in a signal, however, each perform such calculations differently. Such a combination of Teng and Dieterich would not result in multipath information detection as claimed, nor would a working combination of the two distinct methods of calculating coefficients as taught by Teng and Dieterich be possible.

The Examiner stated in paragraph 3 of the Office Action that "there is no criticality in computing the multipath information by computing the difference between the auto-correlation (of stored training sequence) and the cross-correlation (of stored training sequence and received training sequence) ... [and] this is only a matter of design choice." However, the claimed invention adjusts a tap length **based on the detected multipath information from the specific relationship and functions**, as claimed. This distinction, and further the generation of the tap length control signal based on positions of the farthest pre-/post-ghosts by using the detected multipath information and a field sync signal, are not rendered obvious by the Description of the Related Art section in view of Teng and in further view of Dieterich. At least by virtue of the aforementioned differences, the invention defined by claim 1 is patentable over the Applicant Admitted Prior Art in view of Teng and in further view of Dieterich.

Regarding independent claim 5, this claim relates to a method for adjusting filter tap length of an adaptive equalizer corresponding basically to apparatus claim 1. The combination of the Description of the Related Art section, Teng and Dieterich fail to teach at least detecting multipath information from a difference between correlation values of input data applied to the adaptive equalizer and a reference signal, and from an auto correlation value of a training

sequence. The deficiencies of the Description of the Related Art section, Teng and Dieterich are described above. At least by virtue of the aforementioned differences, the invention defined by claim 5 is also patentable over the Applicant Admitted Prior Art in view of Teng in further view of Dieterich. Claim 7 is a dependent claim including all of the elements of independent claim 5, which, as established above, distinguishes over the Applicant Admitted Prior Art in view of Teng in further view of Dieterich. Reconsideration and withdrawal of the rejection under 35 U.S.C. § 103(a) are respectfully requested.

Rejection Under 35 U.S.C. § 103(a) of Claims 2, 6 and 8-12

Claims 2, 6 and 8-12 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the Applicant Admitted Prior Art in view of Teng et al. in further view of Dieterich et al. in further view of Whitaker (tvhandbook.com: ATSC DTV Receiver Systems; Chapter 17.2) in further view of "www.thefreedictionary.com." The rejection is respectfully traversed.

The combination of the Description of the Related Art section, Teng and Dieterich do not teach every element of Applicant's apparatus and method for adjusting filter tap length as recited in claims 1 and 5. Additionally, as admitted by Examiner in paragraph 4 of the Office Action, the Applicant Admitted Prior Art in view of Teng in further view of Dieterich does not disclose a first and second multiplexer for enabling the input data and reference signal when the sync signal is "high." Whitaker and "thefreedictionary.com" do not remedy these deficiencies.

Whitaker discloses data field sync detection by comparing each received data segment from an A/D converter with ideal field 1 and field 2 reference signals to obtain a symbol-by-

symbol difference in a receiver as shown in Figure 17.2.6 (section 17.2.2e). An equalizer compensates for ghosts by using a least-mean-square (LMS) algorithm to compute adjustment of filter taps. A generated estimate of error is correlated with various delayed data signals, with the correlations corresponding to the adjustment needed to be made for each tap to reduce the error at the output (section 17.2.2g). Equalizer training signals consisting of pseudonoise sequences are major parts of the data field sync. The equalizer training signals are made up of 700 symbols (511+63+63+63), as shown in Figure 17.2.15 (section 17.2.2l). The Examiner has cited "thefreedictionary.com" solely to offer a definition of a multiplexer, such that "a two input multiplexer is a simple connection of logic gates whose output Y is either input A or input B depending on the value of a third input S which selects the input."

However, there is no teaching in either Whitaker or "thefreedictionary.com" of at least detecting multipath information from a difference between the correlation values of input data applied to the adaptive equalizer and a training sequence, and from an auto correlation value of a training sequence. There is no mention in Whitaker or "thefreedictionary.com" of using an auto correlation value of the training sequence in obtaining a difference for detecting multipath information. Additionally, the equalizer training signals of Whitaker are made up of 700 symbols. On the other hand, the claimed training sequence/reference signal is 704 symbols. At least by virtue of the aforementioned differences, the invention defined by claims 2 and 6 are patentable over the Applicant Admitted Prior Art in view of Teng in further view of Dieterich in further view of Whitaker in further view of "thefreedictionary.com." Reconsideration and withdrawal of the rejection under 35 U.S.C. § 103(a) are respectfully requested.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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